

adding a catalytic element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment for the crystalline semiconductor thin film at 900 to 1200°C in a reducing atmosphere to flatten a surface of the crystalline semiconductor thin film.

17. (Amended) A method of fabricating a semiconductor device including a thin film transistor, wherein the thin film transistor is formed through the steps of:

adding a catalytic element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film; and

carrying out a second heat treatment for the crystalline semiconductor thin film in a reducing atmosphere including a halogen element to flatten a surface of the crystalline semiconductor thin film.

20. (Amended) A method of fabricating a semiconductor device including a thin film transistor, wherein the thin film transistor is formed through the steps of:

adding a catalytic element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment of irradiating the crystalline semiconductor thin film with ultraviolet light or infrared light; and

carrying out a third heat treatment for the crystalline semiconductor thin film at 900 to 1200°C in a reducing atmosphere to flatten a surface of the crystalline semiconductor thin film.

22. (Amended) A method of fabricating a semiconductor device including a thin film transistor, wherein the thin film transistor is formed through the steps of:

adding a catalytic element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment of irradiating the crystalline semiconductor thin film with ultraviolet light or infrared light; and

carrying out a third heat treatment for the crystalline semiconductor thin film in a reducing atmosphere including a halogen element to flatten a surface of the crystalline semiconductor thin film.

25. (Amended) A method of fabricating a semiconductor device including a thin film transistor, wherein the thin film transistor is formed through the steps of:

adding a catalytic element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

selectively providing the crystalline semiconductor thin film with an element of group 15;

carrying out a second heat treatment to getter the catalytic element into a region of the crystalline semiconductor thin film selectively provided with the element of group 15;

patterning the crystalline semiconductor thin film into at least one crystalline semiconductor island to become at least a channel formation region by removing at least the region of the crystalline semiconductor thin film selectively provided with the element of group 15; and

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carrying out a third heat treatment for the at least one crystalline semiconductor island at 900 to 1200°C in a reducing atmosphere to flatten a surface of the at least one crystalline semiconductor island.

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28. (Amended) A method of fabricating a crystalline semiconductor thin film, comprising the steps of:

adding a catalytic element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film; and

carrying out a second heat treatment for the crystalline semiconductor thin film at 900 to 1200°C in an atmosphere containing hydrogen therein to flatten a surface of the crystalline semiconductor thin film.

Please add new claims 30-87 as follows:

30. A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

etching a surface of said semiconductor film after said crystallizing step to remove an oxide therefrom;

heating said semiconductor film in inactive atmosphere after said etching step while exposing said semiconductor film to said inactive atmosphere.

31. A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

treating a surface of said semiconductor film with hydrofluoric acid after said crystallizing step to remove an oxide therefrom;

heating said semiconductor film in ~~inactive~~ atmosphere after said treating step while exposing said semiconductor film to said ~~inactive~~ atmosphere.

32. A method of fabricating a semiconductor device comprising:
forming a semiconductor film comprising silicon over a substrate;
crystallizing said semiconductor film;
etching a surface of said semiconductor film after said crystallizing step to remove an oxide therefrom;
heating said semiconductor film after said etching step to form a flattened surface of said semiconductor film.

33. A method of fabricating a semiconductor device comprising:
forming a semiconductor film comprising silicon over a substrate;
crystallizing said semiconductor film;
treating a surface of said semiconductor film with hydrofluoric acid after said crystallizing step;
heating said semiconductor film after said treating step to form a flattened surface of said semiconductor film.

34. A method of fabricating a semiconductor device comprising:
forming a semiconductor film comprising silicon over a substrate;
crystallizing said semiconductor film;
etching a surface of said semiconductor film after said crystallizing step to remove an oxide therefrom;
heating said semiconductor film at a temperature of 900 to 1200°C after said etching step.

35. A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;
crystallizing said semiconductor film,
treating a surface of said semiconductor film with hydrofluoric acid after said
crystallizing step to remove an oxide therefrom;
heating said semiconductor film at a temperature of 900 to 1200°C after said treating
step.

36. A method according to claim 30 wherein said heating step is carried out by furnace
annealing.

37. A method according to claim 31 wherein said heating step is carried out by furnace
annealing.

38. A method according to claim 32 wherein said heating step is carried out by furnace
annealing.

39. A method according to claim 33 wherein said heating step is carried out by furnace
annealing.

40. A method according to claim 34 wherein said heating step is carried out by furnace
annealing.

41. A method according to claim 35 wherein said heating step is carried out by furnace
annealing.

42. A method according to claim 32 wherein said heating step is carried out while exposing
said semiconductor film.

43. A method according to claim 33 wherein said heating step is carried out while exposing said semiconductor film.
44. A method according to claim 34 wherein said heating step is carried out while exposing said semiconductor film.
45. A method according to claim 35 wherein said heating step is carried out while exposing said semiconductor film.
46. A method according to claim 30 wherein said crystallizing step is carried out in inactive atmosphere.
47. A method according to claim 30 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.
48. A method according to claim 30 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.
49. A method according to claim 30 wherein said crystallizing step is carried out by heat treatment.
50. A method according to claim 30 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.
51. A method according to claim 30 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

52. A method according to claim 30 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.
53. A method according to claim 31 wherein said crystallizing step is carried out in inactive atmosphere.
54. A method according to claim 31 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.
55. A method according to claim 31 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.
56. A method according to claim 31 wherein said crystallizing step is carried out by heat treatment.
57. A method according to claim 31 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.
58. A method according to claim 31 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.
59. A method according to claim 31 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.
60. A method according to claim 32 wherein said crystallizing step is carried out in inactive atmosphere.

61. A method according to claim 32 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.
62. A method according to claim 32 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.
63. A method according to claim 32 wherein said crystallizing step is carried out by heat treatment.
64. A method according to claim 32 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.
65. A method according to claim 32 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.
66. A method according to claim 32 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.
67. A method according to claim 33 wherein said crystallizing step is carried out in inactive atmosphere.
68. A method according to claim 33 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.
69. A method according to claim 33 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

70. A method according to claim 33 wherein said crystallizing step is carried out by heat treatment.

71. A method according to claim 33 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

72. A method according to claim 33 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

73. A method according to claim 33 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

74. A method according to claim 34 wherein said crystallizing step is carried out in inactive atmosphere.

75. A method according to claim 34 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

76. A method according to claim 34 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

77. A method according to claim 34 wherein said crystallizing step is carried out by heat treatment.

78. A method according to claim 34 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

79. A method according to claim 34 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

80. A method according to claim 34 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

81. A method according to claim 35 wherein said crystallizing step is carried out in inactive atmosphere.

82. A method according to claim 35 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

83. A method according to claim 35 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

84. A method according to claim 35 wherein said crystallizing step is carried out by heat treatment.

85. A method according to claim 35 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

86. A method according to claim 35 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

87. A method according to claim 35 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.